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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/782,498	02/13/2001	Wing-Cheong Gilbert Lai	303.261US3	9926

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SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

EXAMINER

QUACH, TUAN N

ART UNIT PAPER NUMBER

2814

DATE MAILED: 11/20/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/782,498

Applicant(s)

LAI ET AL.

Examiner

Tuan Quach

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-52 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 17-52 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 February 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☒ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3 6) ☐ Other: .

DETAILED ACTION

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 17, 18, 20-36, 37-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fiordalice et al. (Fiordalice) taken with Liou et al. (Liou).

Fiordalice teaches the formation of first titanium nitride 22, second titanium nitride 24 and aluminum layer 26. See Figs 2-6 column 2 line 60 to column 4 line 38. Although Fiordalice shows an intervening tungsten, the claims do not require direct contact and furthermore, the use of an aluminum layer directly on the barrier is conventional as shown in Liou Figs. 2 and 3, column 3 line 28 to column 4 line 27. The use of contacts to source drain region would have been conventional as taught by Liou, column 3 line 29. Regarding the selection of small grain such selection and optimization would have been conventional and advantageous as taught in Liou column 5 line 14-17, column 6 line 35-42. It would have been obvious to have selected the appropriate crystal orientation given the teachings of Fiordalice, column 5 lines 10-55 wherein the desired orientation 111 and 200 or both would have been obvious and advantageous to obtain improved electromigration resistance. It would have been obvious and would have been within the purview of one skilled in the art to have selected the appropriate parameters such as aspect ratios, layer thicknesses.

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Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fiordalice taken with Liou as applied to claims 17, 18, 20-36, 37-52 above, and further in view of Matsumoto et al. (Matsumoto).

The references as applied above do not recite the silicide under the titanium nitride.

Matsumoto '235 shows the formation of the silicide layer 5 followed by TiN layers and aluminum layer. See Fig. 1, column 2 lines 30-64.

It would have been obvious to one skilled in the art in practicing the above process to have employed the silicide since such is conventional and advantageous to form contacts having reduced resistivity as evidenced by Matsumoto.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Fine et al., Kaloyeros et al. and Chittipeddi et al. teach material and structures for semiconductor devices.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Quach whose telephone number is 703-308-1096. The examiner can normally be reached on M - F from 9 to 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor Wael Fahmy can be reached on (703) 308-4918. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9318 (Before Final) and (703) 872-9319 (After Final).

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



Tuan Quach
Primary Examiner